

**Missouri Department of Health and Senior Services**

# **Pediatric Nutrition Surveillance System**



**2008 Summary Report**

## **PREFACE**

This document summarizes selected key pediatric health indicators of infants and children, from birth to 5 years of age, participating in the Missouri WIC Program in 2008, which contributed to the Missouri Pediatric Nutrition Surveillance System in 2008.

Missouri Department of Health and Senior Services

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## **EXECUTIVE SUMMARY**

The Pediatric Nutrition Surveillance System (PedNSS) is a national surveillance system created and maintained by the Centers for Disease Control and Prevention (CDC). The purpose of this system is to monitor the growth status of children of low-income families in federally funded maternal and child health programs. In 2008, the Missouri PedNSS was composed of data collected exclusively from infants and children participating in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). Thus, this report describes the growth status of children from low-income families in Missouri from birth up to the fifth birthday during the calendar year 2008. The data on growth (birthweight, short stature, underweight, overweight) and anemia (low hemoglobin/hematocrit) status of infants and children, and the breastfeeding practices of their mothers were collected in WIC clinics, analyzed by CDC, and used in this report.

### Low and High Birthweight

Low birthweight is the single most important factor affecting neonatal mortality and is a determinant of post-neonatal mortality. In Missouri, very minimal improvements in low birthweight have been observed in the PedNSS population from 1999 to 2008. In 2008, low birthweight remained an area of greatest concern for the Non-Hispanic Black racial and ethnic group (12.7%). However, the prevalence of high birthweight has been declining slightly since 1999, reaching 6.3% in 2008. Hispanic and Non-Hispanic White groups had relatively higher prevalence of being born overweight (7.9% and 7.1% respectively).

### Short Stature

Short stature is an indication of chronic malnutrition. Among the Missouri PedNSS population, the prevalence of short stature, which has decreased since 2006, was 6.7% in 2008. The highest prevalence of this pediatric health indicator was shared among Non-Hispanic Black and Asian/Pacific Islander race/ethnicity groups (7.8% and 7.6% respectively) in 2008. Since 2006, the prevalence of short stature has decreased slightly among all age groups of infants and children with the exception of 24 to 35 month olds (4.8%).

### Underweight

Weight and height were measured to assess the growth status of children participating in the WIC program. In Missouri, the prevalence of underweight has decreased from 1999 to 2008. The highest prevalence was in Non-Hispanic Black infants and children (7.7%). Infants (under 12 months of age) had the highest prevalence of being underweight (8.6%) compared to the other age groups.

### Overweight (Birth to 5 Years)

The prevalence of overweight in infants and children (birth to 5 years) who participated in Missouri PedNSS continued to increase until 2005, when it decreased (11.8%), and remained at the same level in 2006, but increased slightly in 2007 (11.9%) and increased above any levels for the past ten years in 2008 (12.3%). Hispanic and Multiple Race infants and children had higher prevalence of being overweight (16.1% and 14.4% respectively), while Asian/Pacific Islander

and Non-Hispanic Black infants and children had lower prevalence of being overweight (10.1% and 10.7% respectively). The prevalence of overweight infants and children fluctuated with age, being the highest among the 12 to 23 month age group (17.8%) in 2008.

#### Overweight and At Risk for Overweight (2 to 5 Years)

From 1999 to 2008, the prevalence of at risk for overweight among Missouri PedNSS children, age 2 to 5 years, has increased, with some fluctuation, from 15.0% to 16.8%. Over the past 10 years, the prevalence of overweight has also been increasing among Missouri's PedNSS children, age 2 to 5 years, with the exception of decreasing slightly from 13.8% in 2004 to 13.4% in 2005. The prevalence of overweight increased to a high of 13.9% among this population in 2008. The highest prevalence of being overweight (19.2%) and at risk for overweight (18.9%) was among Hispanic children. The proportions of children who were overweight and at risk for overweight increased with age, with the exception of at risk for overweight between 36 to 47 month olds and 48 to 59 month olds (17.1% and 17.0% respectively).

#### Anemia (Low Hemoglobin/Hematocrit)

In Missouri, the prevalence of anemia (low hemoglobin/hematocrit) increased from 16.2% in 2003 to 18.2% in 2007, but decreased to 16.8% in 2008. More than one fourth (28.2%) of the Non-Hispanic Black PedNSS infants and children had low hemoglobin/hematocrit in 2008. Among the PedNSS age groups, the prevalence of anemia was highest (19.8%) among 12 to 23 month olds.

#### Breastfeeding Initiation

The percent of women initiating breastfeeding in Missouri's WIC program has been increasing over the last 10 years, from 44.6% in 1999 to 55.1% in 2008. Hispanic infants had the highest prevalence of being ever breastfed (69.1%), while Non-Hispanic Black infants had the lowest prevalence of being ever breastfed (47.0%).

## INTRODUCTION

The Pediatric Nutrition Surveillance System (PedNSS) is a child-based public health surveillance system that monitors the growth status of nutritionally at-risk children in low-income families<sup>1</sup> who participate in federally funded maternal and child health programs. The goal of PedNSS is to collect, analyze, and distribute surveillance data to assist in planning public health nutrition interventions.

In 2008, the Missouri PedNSS represented infants and children who were enrolled in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). Data were collected for infants and children up to the fifth birthday, who visited WIC clinics for routine care and nutrition services, including nutrition education and supplemental food. In 2008, the data included demographic information (race/ethnicity and age of the participants), birthweight (low birthweight, high birthweight), growth (short stature, underweight, overweight, at risk for overweight), anemia (low hemoglobin/hematocrit), and breastfeeding (initiation and 6 and 12 month duration).

This report summarizes 2008 PedNSS data, highlights trends on key indicators from 1999 through 2008, monitors the Healthy People 2010 Objectives, and compares Missouri PedNSS with the national PedNSS on selected indicators.

In 2008, the Missouri PedNSS reflected 198,863 records on 152,662 infants and children less than 5 years of age. There were 24,532 infants and children from Jackson County. St. Louis City was represented by 16,390 infants and children who participated in WIC in 2008, and 9,243 infants and children from St. Louis County were included in the analysis. The largest number of records contributed from one clinic site was from the Springfield-Greene County WIC agency that collected data on 6,576 infants and children.

### Limitations of the Pediatric Nutrition Surveillance System

The PedNSS was established to monitor the health status of low-income infants and children. In Missouri, only the WIC program contributed to the PedNSS; therefore, the Missouri PedNSS does not represent all low-income infants and children. Care must also be taken when comparing PedNSS among states and the national PedNSS, as the demographic composition differs among the WIC populations in the various states. Plus, the PedNSS population in some states includes children in low income families from other programs in addition to WIC. However, PedNSS is a unique data set. It is the largest, most diverse (racially, ethnically, and geographically) data set available on infants and children from low-income families. The contribution of only WIC data

<sup>1</sup> Potential WIC participants may have a household income up to 185% of the federal poverty level. Please see the 2009 HHS Poverty Guidelines on the website: <http://aspe.hhs.gov/poverty/09poverty.shtml>.

to the PedNSS in Missouri<sup>2</sup> allows easier application of the conclusions and recommendations to WIC participants from birth to 5 years of age. Thus, it helps determine risk factors to assist in planning interventions to decrease infant mortality and nutrition-related health problems among the state's WIC participants.

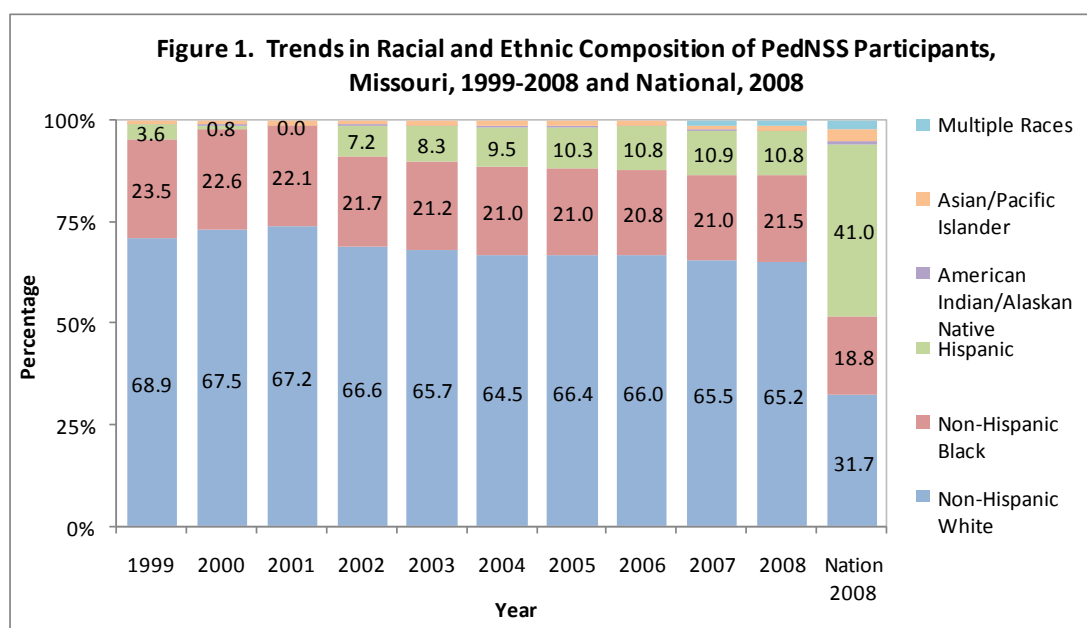
<sup>2</sup> In Missouri, WIC is the only program that contributes data to the national PedNSS. In 2008, 85.4% of the national PedNSS records were contributed by WIC programs of participating states. Other records were contributed by the following: EPSDT (Early Periodic Screening, Diagnosis, and Treatment Program) (5.6%), Title V Maternal and Child Health Program (0.5%), and other programs such as Head Start (8.4%).

## DEMOGRAPHIC CHARACTERISTICS

Demographic information, such as race/ethnicity and age, was associated with differences in birth outcomes, greater health risks and poor growth status of infants and children. The impact of these characteristics on key pediatric health indicators will be discussed throughout this report.

### Race/Ethnicity

In the 2008 Missouri PedNSS, 65.2% of all children who participated were Non-Hispanic White, 21.5% were Non-Hispanic Black, 10.8% were Hispanic, 0.2% were American Indian/Alaskan Native, and 1.2% were Asian/Pacific Islander. Racial and ethnic composition of PedNSS participants has been changing over the last 10 years (Figure 1). The proportion of Hispanic children has increased from 3.6% in 1999 to 10.8% in 2008. Compared to the National PedNSS, the Missouri PedNSS proportions of Hispanic (10.8% in Missouri and 40.9% in the nation) and Asian/Pacific Islander children (1.2% in Missouri and 2.5% in the nation) were smaller, while the proportions of Non-Hispanic White and Non-Hispanic Black children were larger.

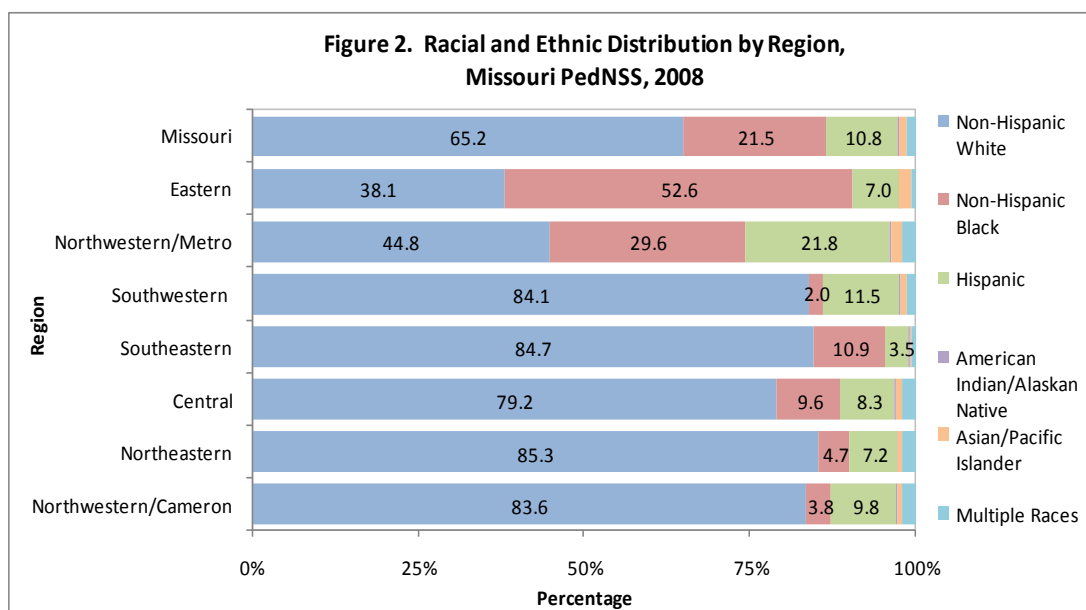


Note: The percentages for only the large racial and ethnic groups were shown on Figure 1. In 2001, the proportion of infants and children of Hispanic ethnicity remained unknown due to a definition change.

The racial and ethnic composition in Missouri differed between the rural and urban regions (Figure 2). The percentages of Non-Hispanic White participants in the urban regions of Eastern and Northwestern/Metro reflected only about half as many as were in the other, primarily rural regions. For example, Non-Hispanic White children in the Northwestern/Cameron region made up about 83.6% of the PedNSS population, while in the Eastern region this racial/ethnic group was 38.1% of the PedNSS population. The largest percentage of Non-Hispanic Black PedNSS participants (52.6%) was in the Eastern region and the smallest was in the Southwestern region



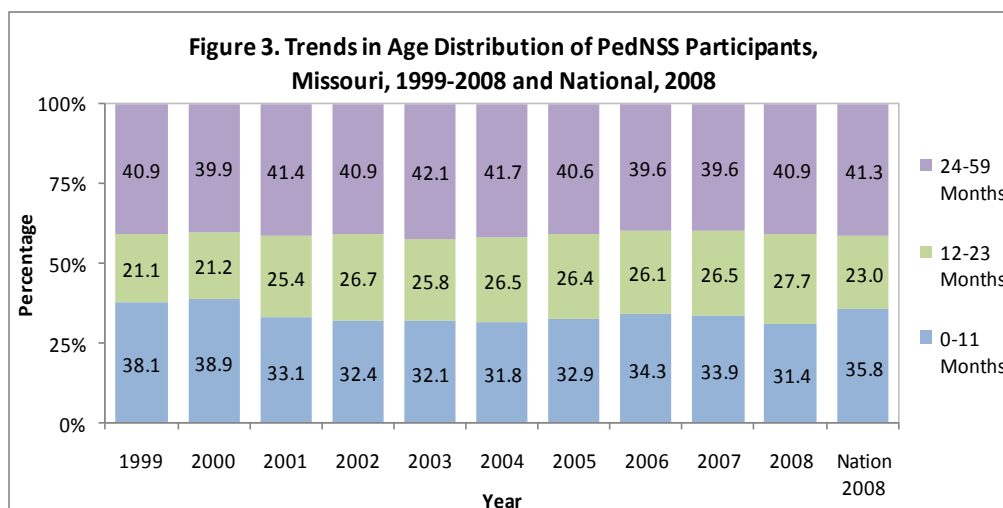
(2.0%). The Northwestern/Metro region had 21.8% Hispanic children, while the Southeastern region had only 3.5%.



Note: The percentages for only the large racial and ethnic groups were shown on Figure 2.

## Age

In the 2008 Missouri PedNSS, about two-thirds of the participants (68.6%) were children age 12 to 59 months, and about one-third of the participants (31.4%) were infants age 0-11 months (Figure 3). These proportions have changed slightly during the past 10 years. Nationally, 37.6% of 2007 PedNSS participants were younger than 12 months, 22.1% were age 12-23 months, and 40.3% were age 24-59 months.

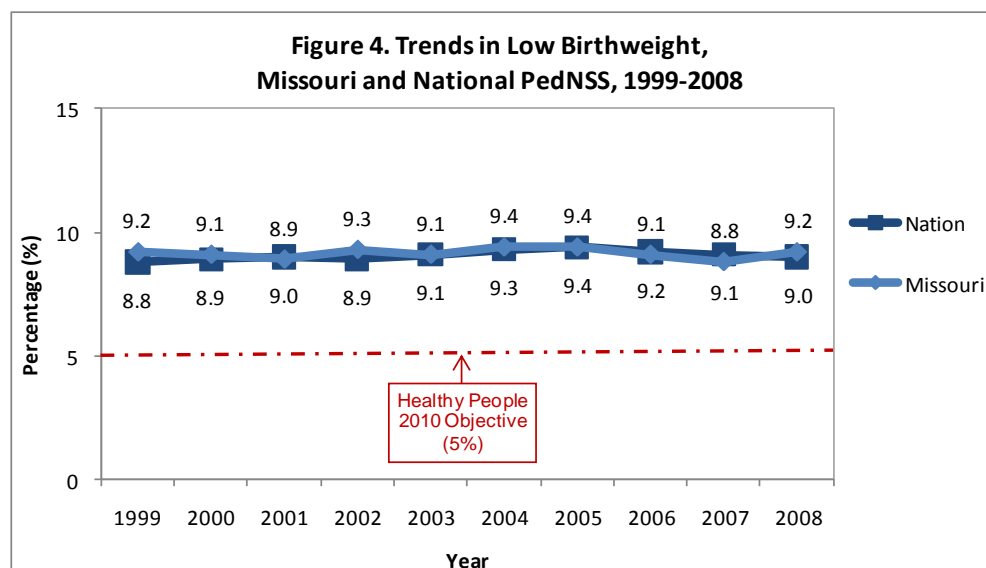


## PEDIATRIC HEALTH INDICATORS

### Low Birthweight<sup>3</sup>

Low birthweight (less than 2,500 grams or 5.5 pounds) is a major determinant of neonatal mortality and post-neonatal mortality (1). Infants with low birthweight are more likely to experience developmental delays and disabilities than infants with normal birthweight (2). The main factors that can lead to low birthweight include poor maternal nutrition and maternal risky behaviors, especially smoking, drinking alcohol and the use of non-prescribed drugs. Some researchers suggested that regular intake of the recommended amount of folic acid and micronutrient supplements throughout pregnancy may reduce the risk of having a low birthweight baby (3,4). The Healthy People 2010 Objective seeks to reduce low birthweight to 5% of all live births.

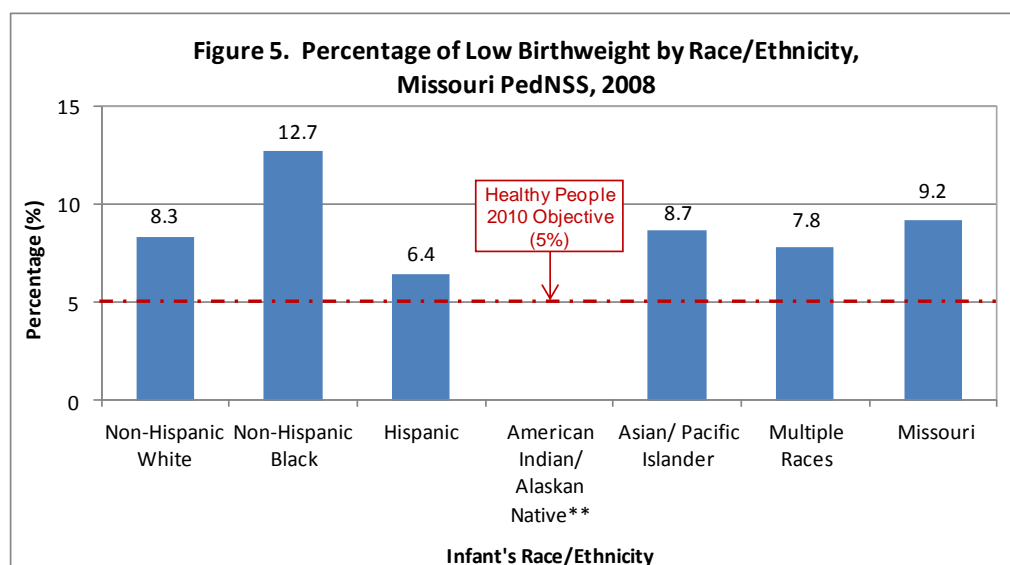
Of all the infants born in 2008 included in the Missouri PedNSS, 9.2% had low birthweight. During the last 10 years, this rate has been relatively stable (Figure 4). There has been no noticeable movement toward achieving the Healthy People 2010 Objective.



Note: It is advised that the trend data in Missouri and the nation should not be compared directly since they had different distributions of race/ethnicity.

<sup>3</sup> Refer to the map in [Appendix 1](#) to see the prevalence of low birthweight by county (Missouri PedNSS 2006-2008 combined years).

The prevalence of low birthweight in the 2008 Missouri PedNSS varied by race and ethnicity. The prevalence was nearly two times as high among Non-Hispanic Black infants (12.7%) than among Hispanic infants (6.4%) (Figure 5). None of the racial and ethnic groups achieved the national Healthy People 2010 objective of 5%.



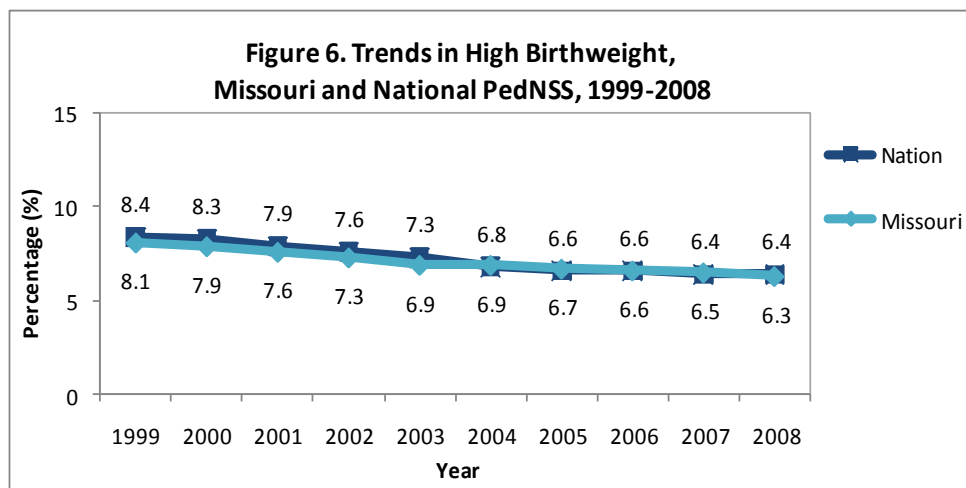
\*\* According to CDC's criteria, analysis is not conducted if the number of cases is less than 100.

### High Birthweight<sup>4</sup>

High birthweight (greater than 4,000 grams) increases the risk for infant death and birth injuries (5). High birthweight may result in obesity in childhood that may extend into adult life (6). Maternal prepregnancy overweight and greater than ideal maternal weight gain can be considered strong predictors of high birthweight (7).

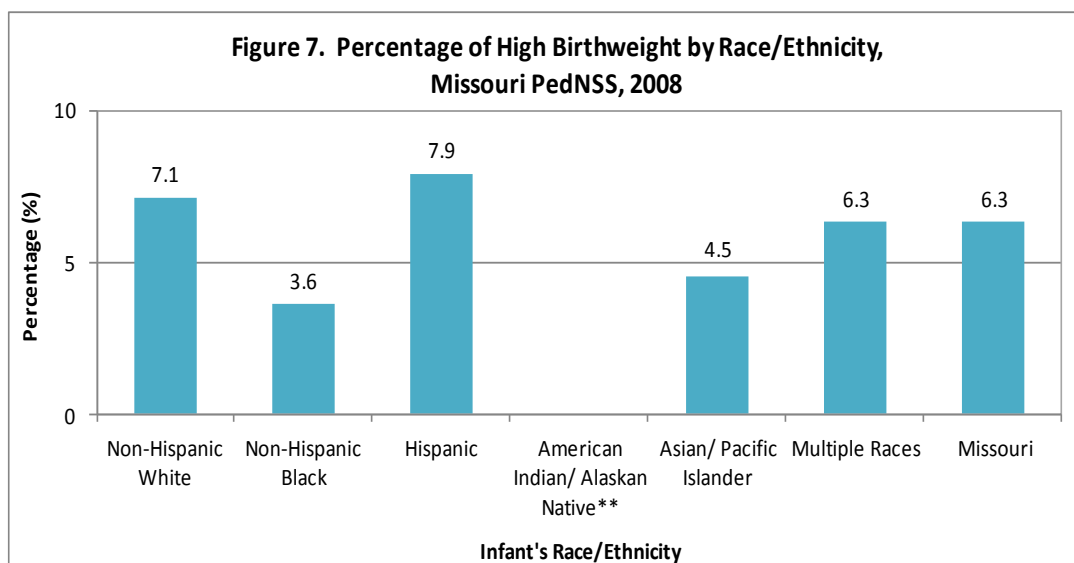
Of the infants born in 2008 included in Missouri PedNSS, 6.6% were born overweight (Figure 6). During the last 10 years, this rate was highest in 1999 (8.1%) and lowest in 2008 (6.3%). Since 1999, the rate has been gradually decreasing, indicating that some progress has been made in the prevention of high birthweight.

<sup>4</sup> Refer to the map in [Appendix 2](#) to see the prevalence of high birthweight by county (Missouri PedNSS 2006-2008 combined years).



Note: It is advised that the trend data in Missouri and the nation should not be compared directly since they had different distributions of race/ethnicity.

The prevalence of high birthweight varied by racial and ethnic group. It was highest in the Hispanic group (7.9%), and lowest in the Non-Hispanic Black group (3.6%).

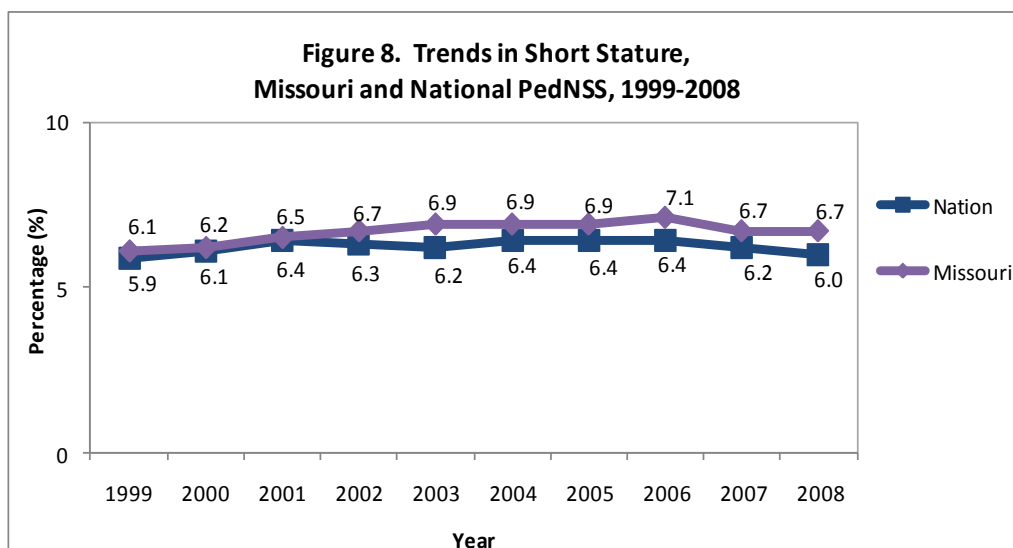


\*\* According to CDC's criteria, analysis is not conducted if the number of cases is less than 100.

## Short Stature<sup>5</sup>

Short stature is defined as a length or stature less than the 5<sup>th</sup> percentile on the CDC age- and gender-specific length or stature reference (2000 CDC Growth Charts). Short stature, also referred to as low-length/height-for-age or stunting, is used as an indicator of chronic malnutrition. It reflects the long-term health and nutritional history of a child. A variety of health conditions (such as low birthweight) affect growth status and there are specialized charts that may be considered for use with children affected by these conditions. One of the Healthy People 2010 Objectives is to reduce growth retardation to 5% among children less than 5 years of age from low-income families.

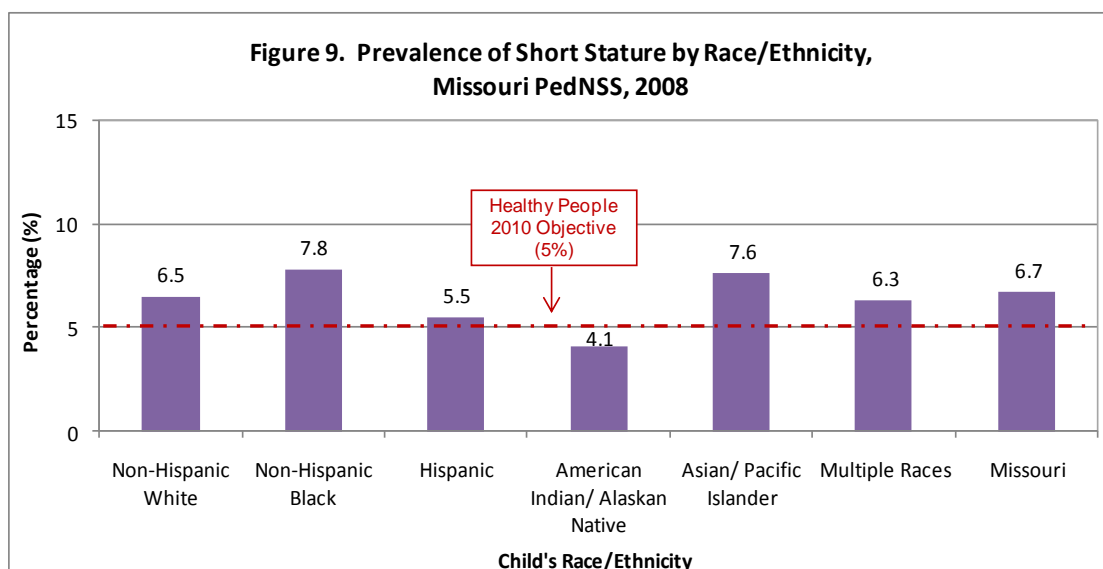
In Missouri PedNSS (children less than 5 years of age), the prevalence of short stature increased from 1999 to 2006, then decreased slightly in 2007, remaining stable in 2008 (Figure 8). The lowest prevalence of 6.1% was in 1999, and the highest prevalence of 7.1% was in 2006. The prevalence of short stature in 2008 was 6.7%.



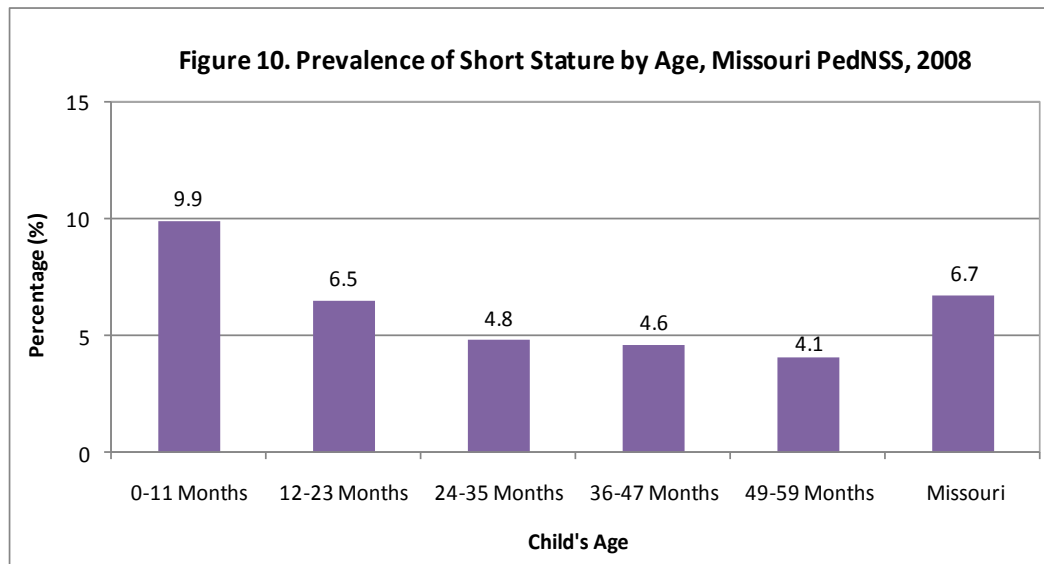
Note: It is advised that the trend data in Missouri and the nation should not be compared directly since they had different distributions of race/ethnicity.

The prevalence of short stature in Missouri PedNSS in 2008 (Figure 9) was higher than the 2010 Healthy People Objective. In the 2008 Missouri PedNSS, Non-Hispanic Black infants and children had the highest prevalence of short stature (7.8%), while American Indian/Alaskan Native infants and children had the lowest prevalence (4.1%). However, since the number of infants and children in the American Indian/Alaskan Native group was small ( $n = 241$ ), caution should be taken in concluding that the prevalence of short stature was much lower than in the other groups.

<sup>5</sup> Refer to the map in [Appendix 3](#) to see the prevalence of short stature by county (Missouri PedNSS 2006-2008 combined years).



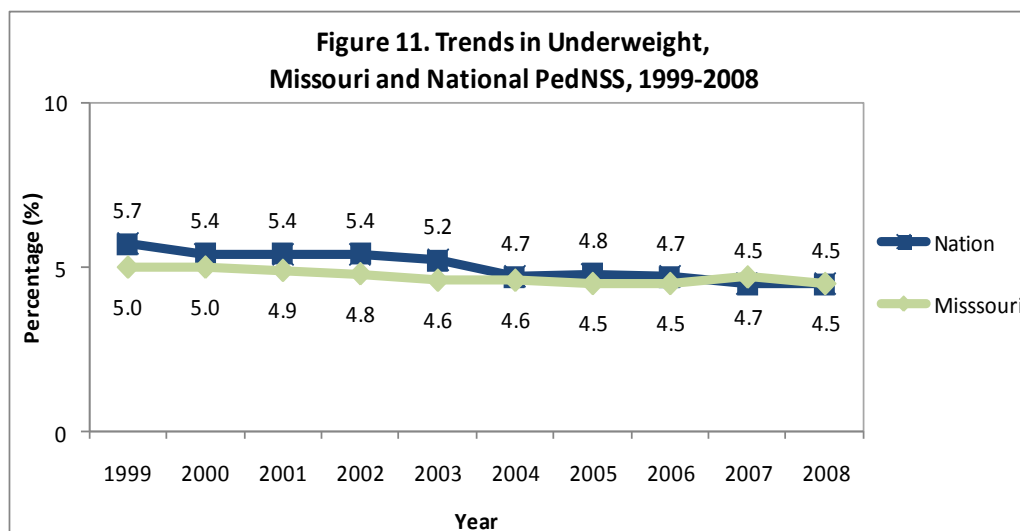
In the 2008 Missouri PedNSS population (infants and children less than 5 years of age), the prevalence of short stature decreased with the age of the participants (Figure 10). The age group of 0-11 months had the highest prevalence of short stature (9.9%), and the age group of 48-59 months had the lowest prevalence (4.1%).



## Underweight<sup>6</sup>

Underweight in the PedNSS is based on the 2000 CDC gender-specific growth chart percentiles of less than the 5<sup>th</sup> percentile weight-for-length for children younger than 2 years of age and less than the 5<sup>th</sup> percentile BMI<sup>7</sup>-for-age for children age 2 years or older. Food shortages and disease outbreaks can result in high prevalence of underweight infants and children (8), thus an underweight prevalence rate greater than 5% may indicate serious health and nutrition problems.

Over the last 10 years, the prevalence of underweight in the Missouri PedNSS (infants and children less than 5 years of age) has decreased from 5.0% in 1999 to 4.5% in 2008 (Figure 11). Overall, the 2008 prevalence indicated that acute malnutrition was not considered a public health problem in the Missouri PedNSS population since it was lower than the Healthy People 2010 Objective of 5.0%.

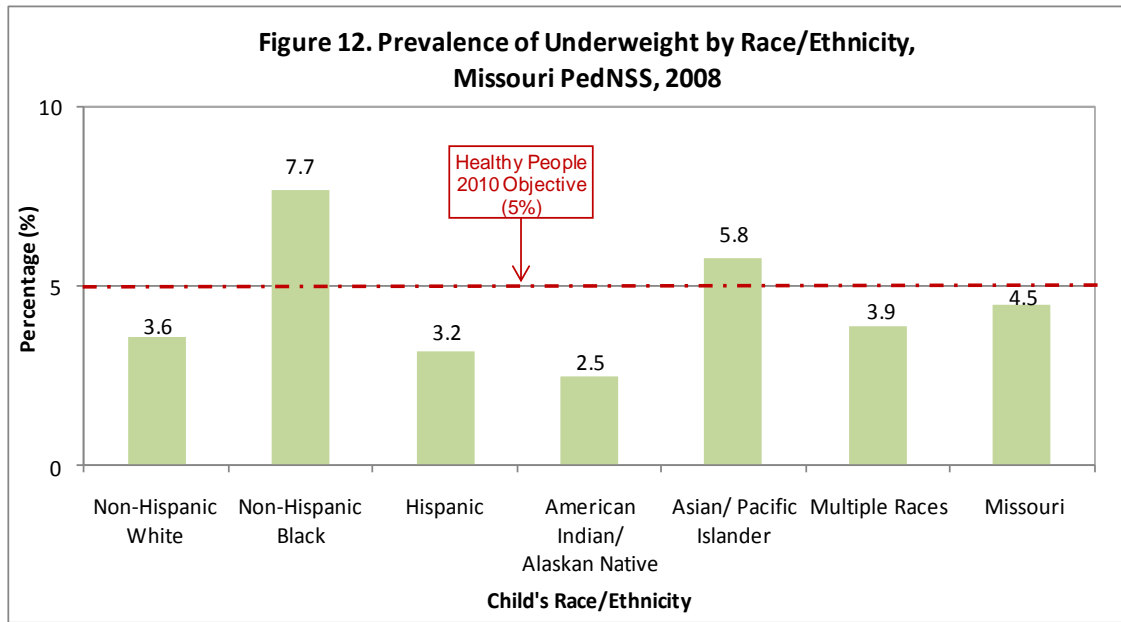


Note: It is advised that the trend data in Missouri and the nation should not be compared directly since they had different distributions of race/ethnicity.

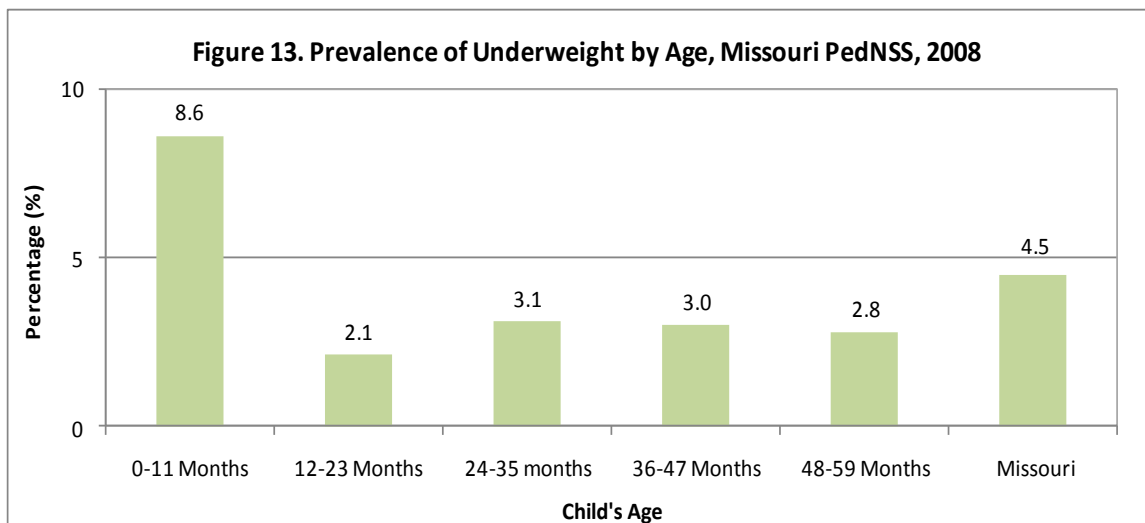
The higher prevalence of underweight in the 2008 Missouri PedNSS occurred among Non-Hispanic Black children (7.7%) and Asia/Pacific Islander children (5.8%) (Figure 12). However, the prevalence of underweight children in the Non-Hispanic White, Hispanic, and American Indian/Alaskan Native groups were lower than the Healthy People 2010 Objective of 5%. It should be noted that caution should be taken in concluding that the prevalence of underweight was lower than the other groups since the number of children in the American Indian/Alaskan Native group was small (n = 241).

<sup>6</sup> Refer to the map in [Appendix 4](#) to see the prevalence of underweight by county (Missouri PedNSS 2006-2008 combined years).

<sup>7</sup> BMI, Body Mass Index, is a number calculated from a person's weight and height. The formula is weight in kilograms divided by height in meters squared (kg/m<sup>2</sup>).



Infants (0-11 months old) had a higher prevalence of being underweight (8.6%) in the Missouri PedNSS population in 2008 compared to the other age groups (Figure 13).

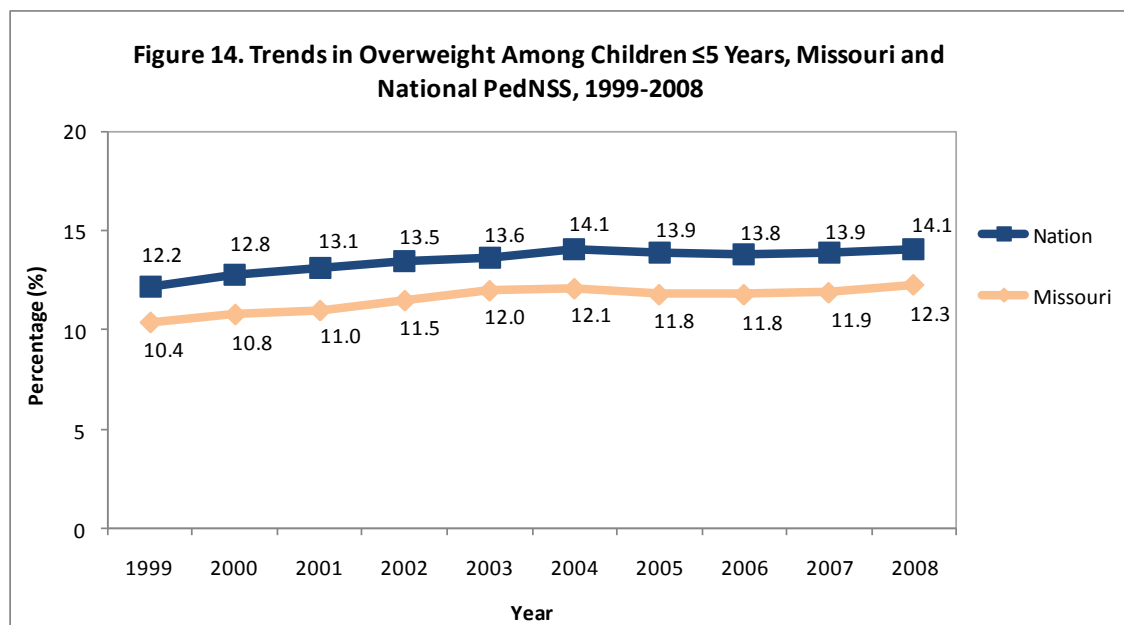




### Overweight (Birth to 5 Years of Age)<sup>8</sup>

The prevalence of childhood and adolescent overweight has tripled over the past two decades. Associations have been identified between dietary patterns, physical activity, sedentary behaviors, and overweight (9). In the PedNSS, overweight is based on the 2000 CDC growth chart percentiles of greater than or equal to the 95<sup>th</sup> percentile weight-for-length for children less than 2 years of age and greater than or equal to the 95<sup>th</sup> percentile BMI-for-age for children 2 years of age or older.

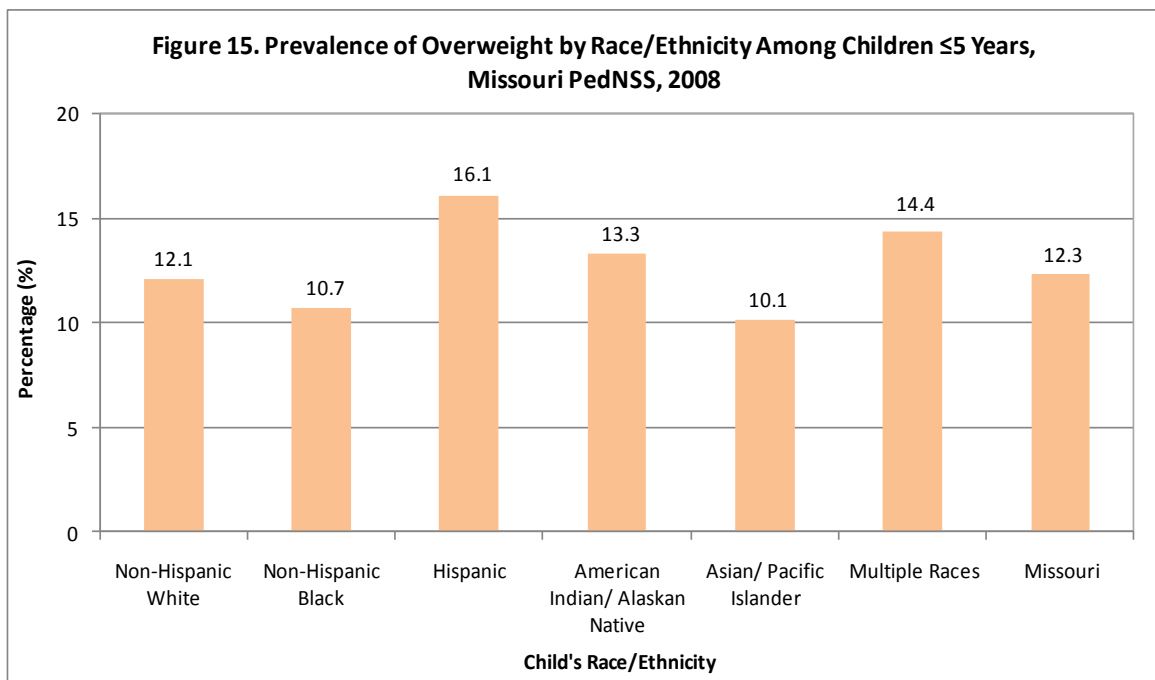
During the past 10 years in the Missouri PedNSS, the prevalence of overweight in children from birth to age 5 has been increasing, from 10.4% in 1999 to 12.3% in 2008 (Figure 14). Although there was a decline in 2005, the prevalence in overweight continued to increase in 2007 for both Missouri and the nation.



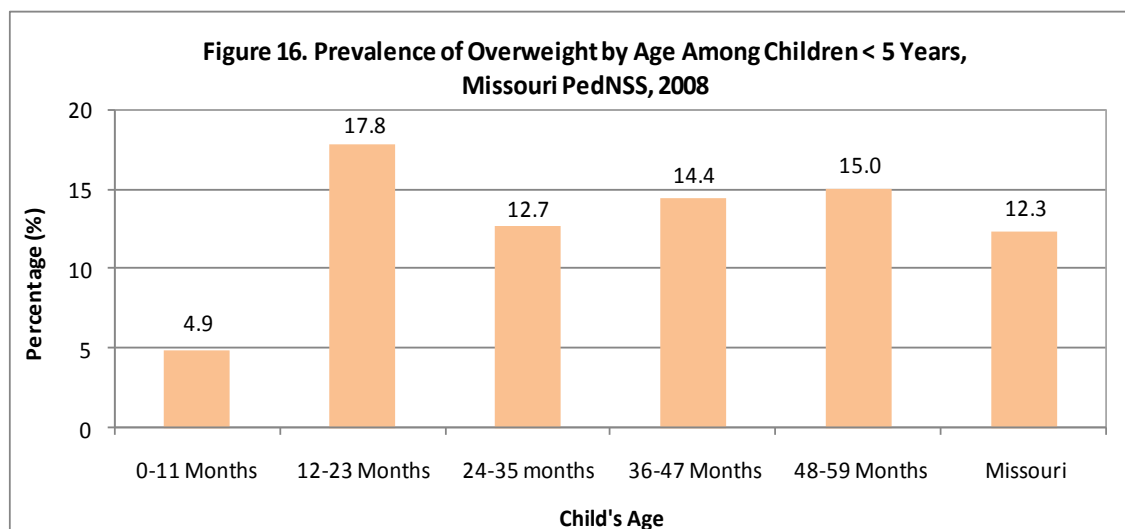
Note: It is advised that the trend data in Missouri and the nation should not be compared directly since they had different distributions of race/ethnicity.

The highest prevalence of overweight in the 2008 Missouri PedNSS occurred among Hispanic children (16.1%) (Figure 15). The prevalence of overweight was lowest among Asian/Pacific Islander (10.1%) children. Caution should be taken when comparing the American Indian/Alaskan Native group to the others since the number of children in this group was small (n = 241).

<sup>8</sup> Refer to the map in [Appendix 5](#) to see the prevalence of overweight (birth to 5 years of age) by county (Missouri PedNSS 2006-2008 combined years).



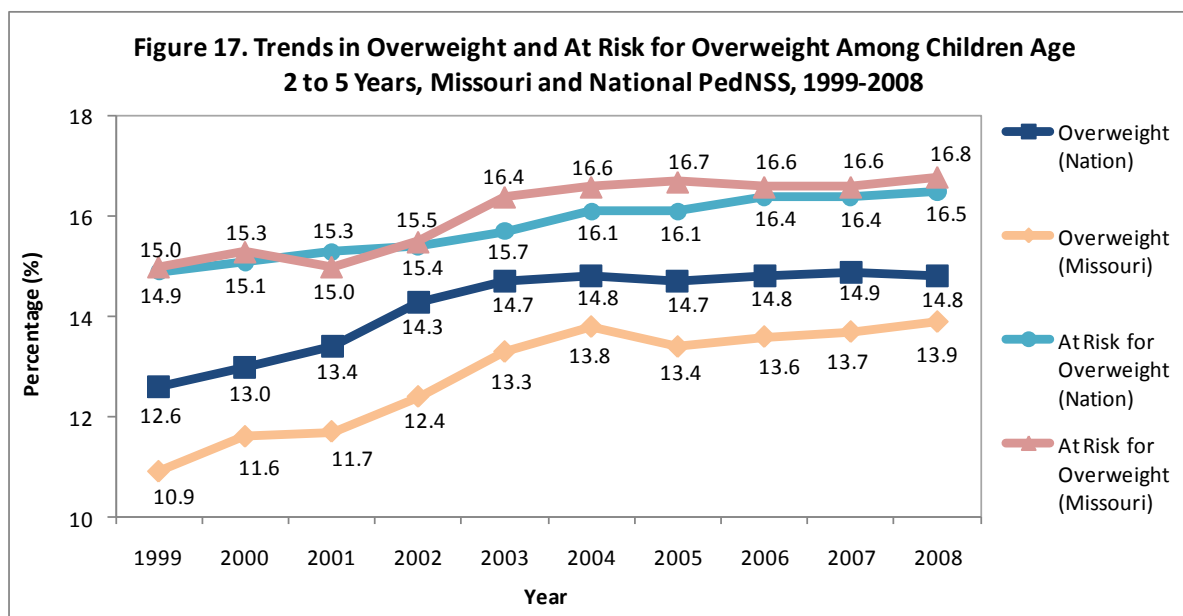
From the perspective of age groups, the highest prevalence of overweight (17.8%) in the 2008 Missouri PedNSS was in the 12-23 month group, and the lowest prevalence (4.9%) was in the 0-11 month group (Figure 16).



### Overweight and At Risk for Overweight (2 to 5 Years of Age)<sup>9</sup>

Overweight in children younger than 2 years old does not cause the same risk as for children age 2 or older. A weak association has been found between the 2 years or older group's weight and an increased risk for adult obesity (10). The Expert Committee on Clinical Guidelines for Overweight in Adolescent Preventive Services recommended a two-level screening for overweight in children age 2 years or older. The suggestion was to use BMI-for-age at or above the 95<sup>th</sup> percentile to define overweight and between the 85<sup>th</sup> and 95<sup>th</sup> percentile to define at risk for overweight (11).

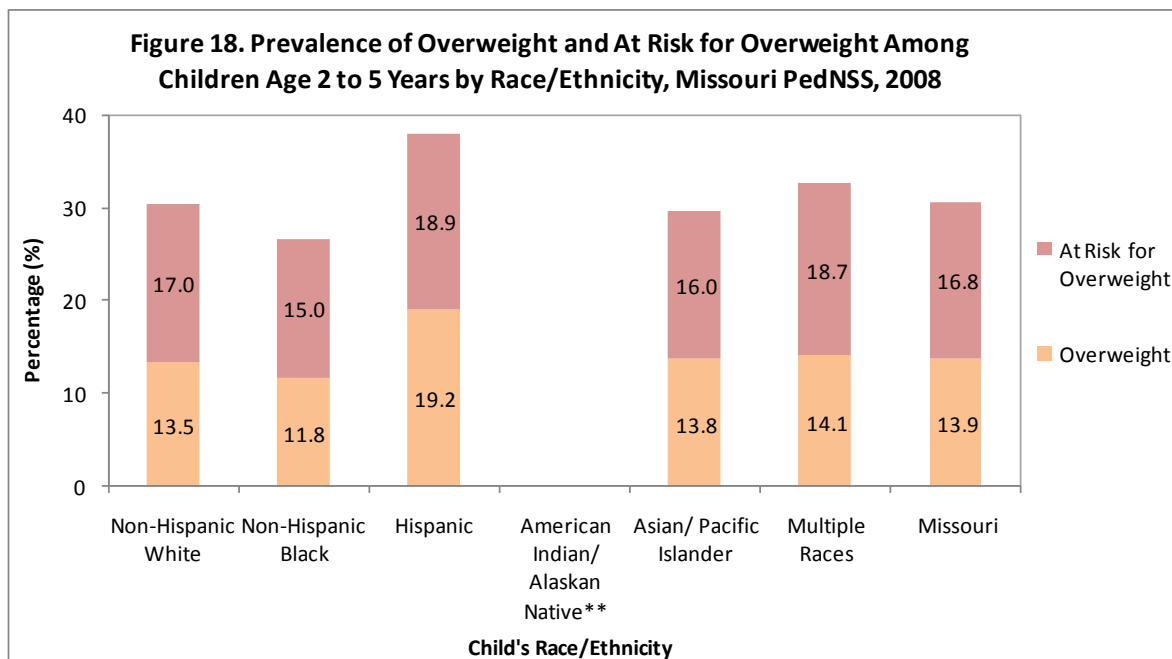
Over the last 10 years, the rate of overweight among Missouri's PedNSS children, age 2 to 5 years, increased from 10.9% in 1999 to 13.8% in 2004. It decreased for the first time in 2005 to 13.4%, but increased again in 2006 and continued to increase through 2008 to 13.9% (Figure 17). The rate of at risk for overweight for this group of children increased from 15.0% in 1999 to 16.7% in 2005. It decreased to 16.6% in 2006 and 2007 but increased again in 2008 to 16.8%.



Note: It is advised that the trend data in Missouri and the nation should not be compared directly since they had different distributions of race/ethnicity.

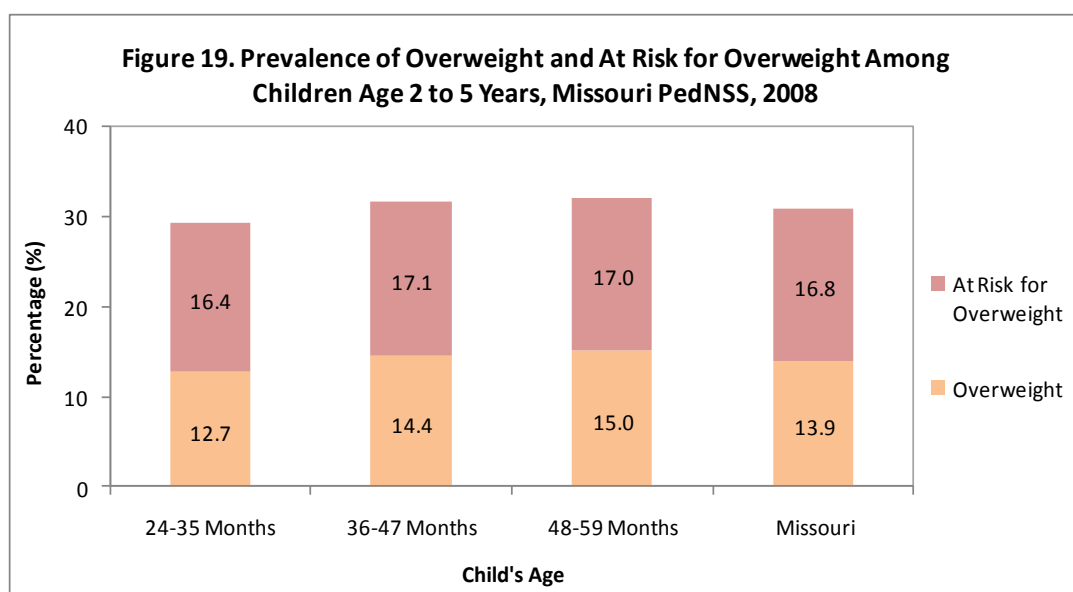
In the 2008 Missouri PedNSS, the highest prevalence of overweight (19.2%) and at risk for overweight (18.9%) were among Hispanic children (Figure 18). Compared to all other racial and ethnic groups, Non-Hispanic Black children age 2 to 5 years were the least likely to be overweight (11.8%) and at risk for overweight (15.0%).

<sup>9</sup> Refer to the maps in [Appendix 6](#) and [Appendix 7](#) to see the rates of overweight and at risk for overweight (2-5 years of age) by county (Missouri PedNSS 2006-2008 combined years).



\*\* According to CDC's criteria, analysis is not conducted if the number of cases is less than 100.

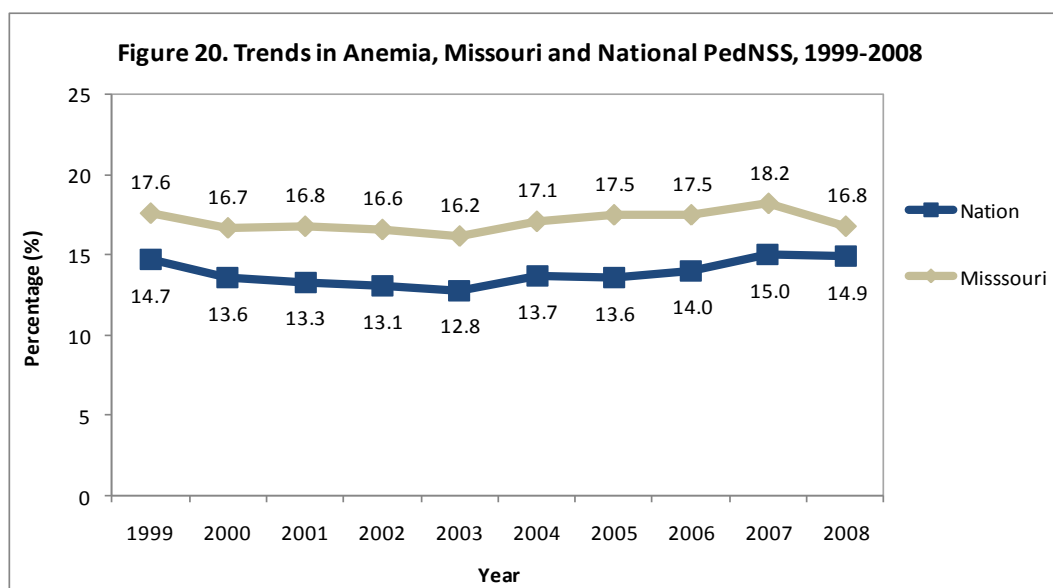
The prevalence of overweight increased with age among children in the 2008 Missouri PedNSS (Figure 19). In the 24-35 month age group, 12.7% of the children were overweight; in the 36-47 month age group, 14.4% of the children were overweight; and in the 48-59 month age group, 15.0% of the children were overweight. The prevalence of at risk for overweight increased with age from the 24-35 month age group (16.4%) to the 36-47 month age group (17.1%). However, the prevalence of at risk for overweight declined just slightly in the 48-59 month age group (17.0%).



## Anemia (Low Hemoglobin/Hematocrit)<sup>10</sup>

Anemia in the PedNSS refers to a hemoglobin or hematocrit level lower than the age-adjusted reference range for healthy children<sup>11</sup>. Anemia is the most common indicator of nutrient (iron) deficiency in the world (12). Iron deficiency in children is associated with long-lasting diminished mental, motor and behavioral functioning (13). Racial differences exist, with Non-Hispanic Black children having lower normal values than Non-Hispanic White and Asian/Pacific Islander children of the same age and socioeconomic background (14). The Healthy People 2010 Objective is to reduce anemia among children age 1 to 2 years to 5% and children age 3 to 4 years to 1%<sup>12</sup>.

In the 2008 Missouri PedNSS, the prevalence of anemia (infants and children 6 months of age and older included in analysis)<sup>13</sup> has declined since 1999 (Figure 20). Over the last 10 years, it reached the lowest prevalence of 16.2% in 2003 and highest prevalence of 18.2% in 2007. However, the prevalence of anemia decreased to 16.8% in 2008.



Note: It is advised that the trend data in Missouri and the nation should not be compared directly since they had different distributions of race/ethnicity.

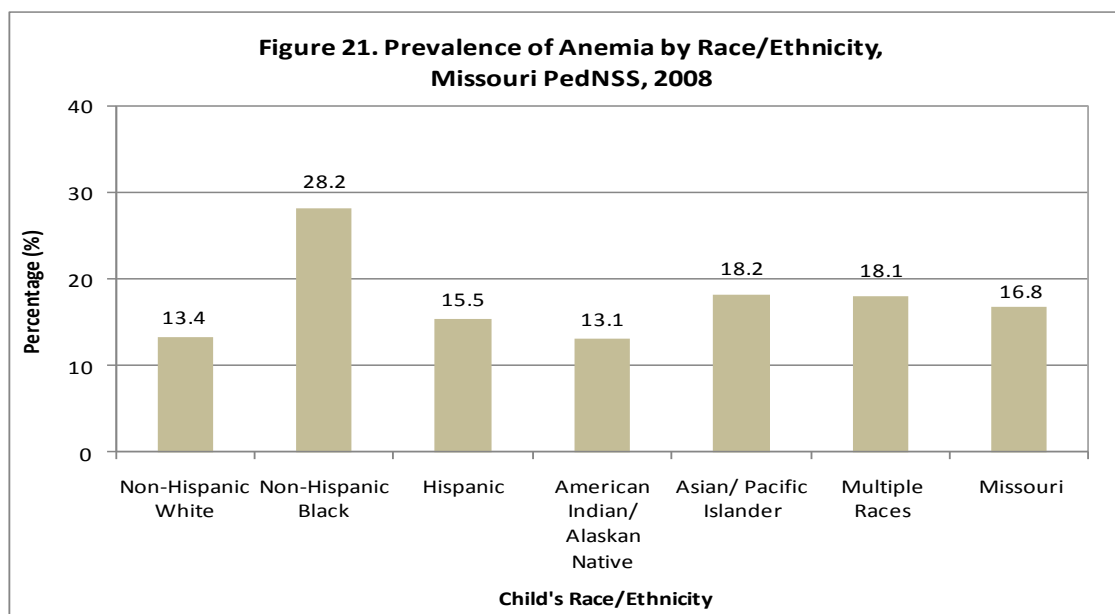
<sup>10</sup> Refer to the map in [Appendix 8](#) to see the prevalence of anemia by county (Missouri PedNSS 2006-2008 combined years).

<sup>11</sup> In PedNSS, children age 1 to 2 years are considered anemic if their hemoglobin concentration is less than 11.0 g/dL or their hematocrit level is less than 33.0%. Children age 2-5 years are considered anemic if their hemoglobin concentration is less than 11.1 g/dL or their hematocrit level is less than 33.3%.

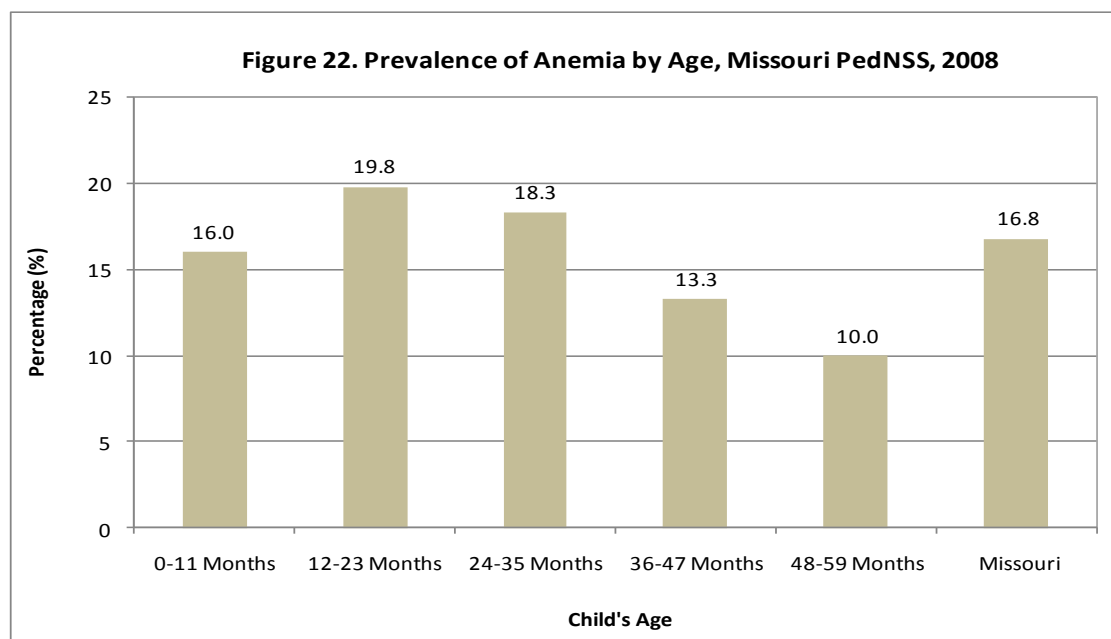
<sup>12</sup> In PedNSS, age groups are 6-11 months, 12-17 months, 18-23 months, 24-35 months, and 36-59 months. Therefore, this classification does not allow comparing low hemoglobin/hematocrit prevalence directly between PedNSS and the Healthy People 2010 objective.

<sup>13</sup> For this indicator, infants less than 6 months of age were not included in analysis.

The proportion of infants and children with anemia (low hemoglobin/hematocrit) in the 2008 Missouri PedNSS varied in different racial and ethnic groups (Figure 21). The highest prevalence of low hemoglobin/hematocrit was in the Non-Hispanic Black group (28.2%), while the lowest prevalence of anemia was in the American Indian/Alaskan Native group (13.1%). However, since the number of infants and children in the American Indian/Alaskan Native group was small ( $n = 137$ ), caution should be taken in concluding that the prevalence of anemia was much lower than in the other groups.



The highest prevalence of anemia (19.8%) in the 2008 Missouri PedNSS occurred in infants 12-23 months old (Figure 22). After this age, the prevalence of anemia decreased with age to the lowest prevalence of 10.0% among the 48-59 month olds.

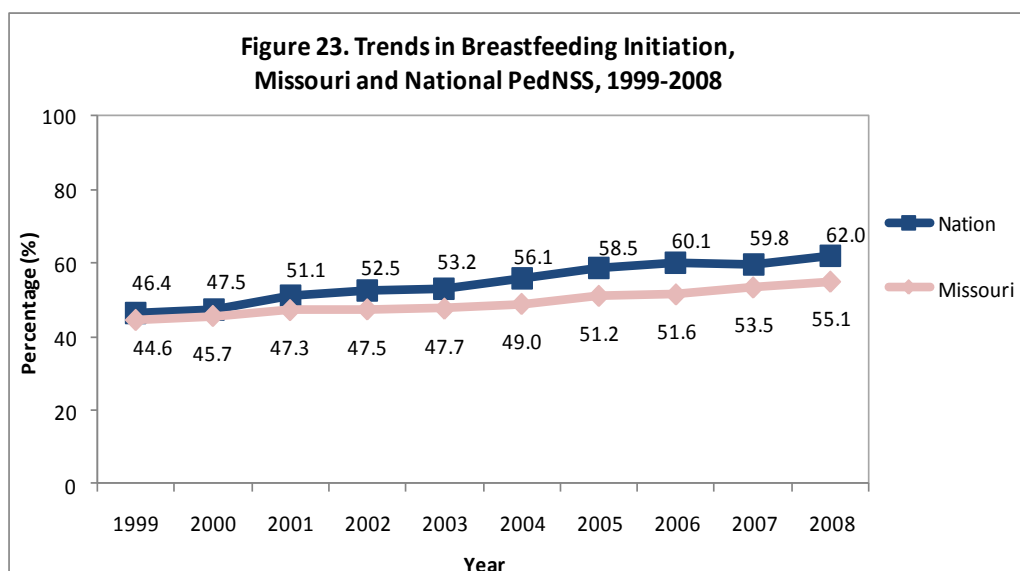


### Breastfeeding Initiation<sup>14</sup>

The health and economic benefits of breastfeeding are well documented. According to the American Academy of Pediatrics (AAP), human milk is “uniquely suited” for human infants (15). With rare exceptions, human milk provides the most complete form of nutrition for infants, including premature and sick newborns. Accordingly, the AAP recommends that infants be breastfed exclusively for the first six months after birth and that breastfeeding continue through the entire first year of life. Breastfeeding after the first 12 months should continue as long as mutually desired. When direct breastfeeding is not possible, expressed breast milk, fortified when necessary for the premature infant, should be provided (16).

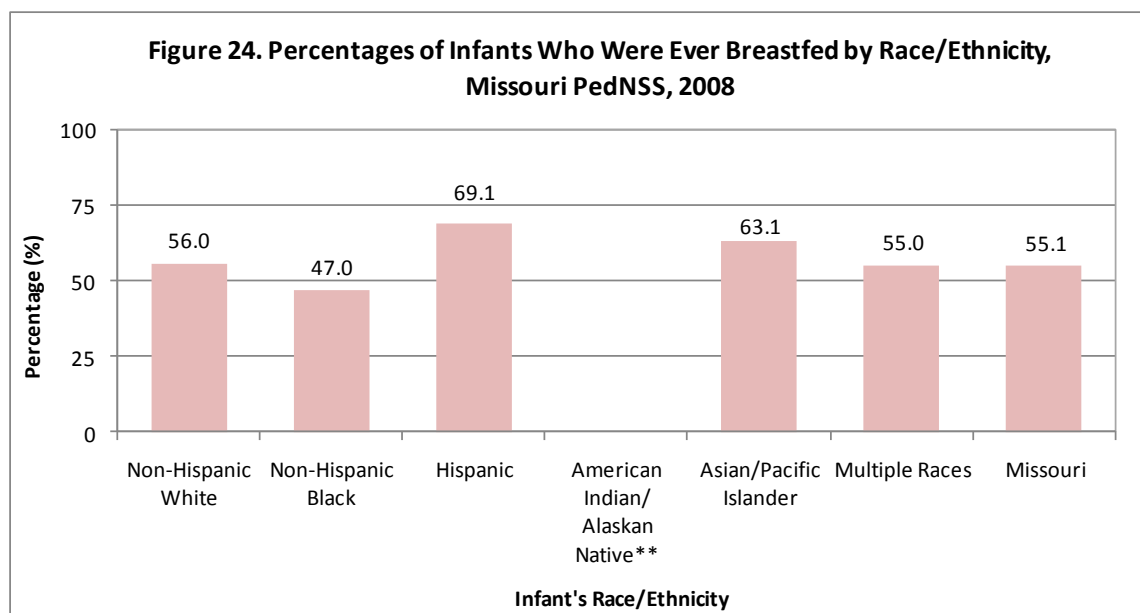
In the PedNSS, breastfeeding initiation is determined by indicator “ever breastfed”. The overall prevalence of breastfeeding initiation among infants in the Missouri PedNSS has been increasing over the last 10 years from 44.6% in 1999 to 55.1% in 2008 (Figure 23). The Healthy People 2010 Objective in breastfeeding initiation (75%) was far from being achieved in the Missouri WIC population in 2008. However, the increasing trend in breastfeeding initiation is in the right direction.

<sup>14</sup> Refer to the map in [Appendix 9](#) to see the percentage of infants ever breastfed by county (Missouri PedNSS 2006-2008 combined years).



Note: It is advised that the trend data in Missouri and the nation should not be compared directly since they had different distributions of race/ethnicity.

Hispanic infants (69.1%) were more likely to be ever breastfed than infants in all other racial and ethnic groups in the 2008 Missouri PedNSS (Figure 24). The Non-Hispanic Black infants (47.0%) were the least likely to be ever breastfed in 2008.



\*\* According to CDC's criteria, analysis is not conducted if the number of cases is less than 100.



## CONCLUSIONS AND RECOMMENDATIONS

An important use of the PedNSS data is to compare the status of certain indicators in Missouri with the Healthy People 2010 Objectives that were developed for the nation. These objectives were designed to serve as a goal for monitoring progress towards improving the health of the nation.

<b>Table 9: Monitoring Healthy People 2010 Objectives Using Missouri PedNSS Trends 1999-2008 and Comparing Missouri and National PedNSS Data on Selected Health and Behavioral Indicators</b>				
<b>Indicator</b>	<b>Healthy People 2010 Objectives Monitored by PedNSS*</b>	<b>Trend of the Missouri PedNSS 1999-2008</b>	<b>National PedNSS Prevalence 2008</b>	<b>Missouri PedNSS Adjusted Prevalence 2008**</b>
<b>Low Birthweight</b>	Decrease low birthweight to 5% (16-10b)	Stable	9.0	8.0
<b>Short Stature</b> <b>Underweight</b>	Reduce growth retardation among low-income children under 5 years of age to 5% (19-4)			
	<ul style="list-style-type: none"> <li>• Short Stature</li> <li>• Underweight</li> </ul>	<ul style="list-style-type: none"> <li>• Increase from 1999-2006, decrease in 2007 and stable in 2008</li> <li>• Decrease from 1999 to 2008, objective met</li> </ul>	6.0  4.5	6.2  4.2
<b>Breastfeeding Initiation</b>	Increase the proportion of mothers who breastfeed in the early postpartum period to 75% (16-19a)	Increase since 1999	62.0	57.7
<b>Breastfed At Least 6 Months</b>	Increase the proportion of mothers who breastfeed at 6 months to 50 % (16-19b)	Decreased slightly from 2007-2008	26.9	17.9***
<b>Breastfed At Least 12 Months</b>	Increase the proportion of mothers who breastfeed at 12 months to 25% (16-19c)	Decreased from 2007-2008	19.1	8.0***

\* Healthy People 2010 Objectives on web: <http://www.healthypeople.gov>.

\*\* All prevalence values have been standardized based on the race/ethnicity distribution of the nation, according to CDC's procedure, thus making the state PedNSS population comparable to the national PedNSS population.

\*\*\* Previous procedures for breastfeeding duration data collection did not capture adequate data to measure duration. However, the procedures were modified in 2007 to allow for collecting more reliable data since 2007 for the measurement of breastfeeding duration.

The 10-year trend data (from 1999 to 2008) showed improvement in decreasing the proportion of underweight infants and children in the WIC population below the Healthy People 2010 Objective of 5%. Additionally, progress has been made in breastfeeding initiation. Slight improvement has also been made in reducing the proportion of infants and children with short stature in the WIC population. However, the Healthy People 2010 Objective pertaining to reduction of the percentage of low birthweight has not shown advances (Table 9).

Compared with the national PedNSS data shown in Table 1, the percentage of low birth weight babies and the percentage of underweight babies in the 2008 Missouri PedNSS were lower than the national levels. Missouri had the same prevalence as the national PedNSS population on the

indicator of short stature. However, breastfeeding initiation and both indicators of breastfeeding duration in the 2008 Missouri PedNSS were lower than the national prevalence.<sup>15</sup>

The PedNSS data summary indicates the need for the following actions:

- Prevent low birthweight by providing preconception nutrition care and outreach activities to promote early identification of pregnancy and early entry into comprehensive prenatal care, including medical care and WIC program services.
- Identify children with short stature and appropriately monitor to assure that they receive adequate nutrients to promote optimal growth, and that there are no other health problems limiting growth.
- Implement innovative strategies to reverse the rising trend of overweight in young children by increasing breastfeeding, increasing physical activity, promoting increased consumption of fruits and vegetables, and decreasing sedentary time. Routinely screen for overweight and at risk for overweight using BMI-for-age recommended by the American Academy of Pediatrics Policy Statement (17).
- Conduct hemoglobin/hematocrit screening to identify all infants and children at highest risk of having iron deficiency anemia, develop and implement effective intervention strategies, including nutrition education focused on iron rich foods and iron absorption-enhancing foods and provide follow-up to improve iron nutrition status.
- Promote and support breastfeeding through medical care systems, work sites and communities.

<sup>15</sup> The proportions of racial and ethnic indicators in the national 2008 PedNSS were different from those in the 2008 Missouri PedNSS. Therefore, to make the Missouri PedNSS population comparable on indicators of interest to the nation, a standardization procedure was applied to Missouri's PedNSS data when a comparison occurs. The procedure is available on CDC's website: [http://www.cdc.gov/pednss/how\\_to/interpret\\_data/what/example.htm](http://www.cdc.gov/pednss/how_to/interpret_data/what/example.htm)

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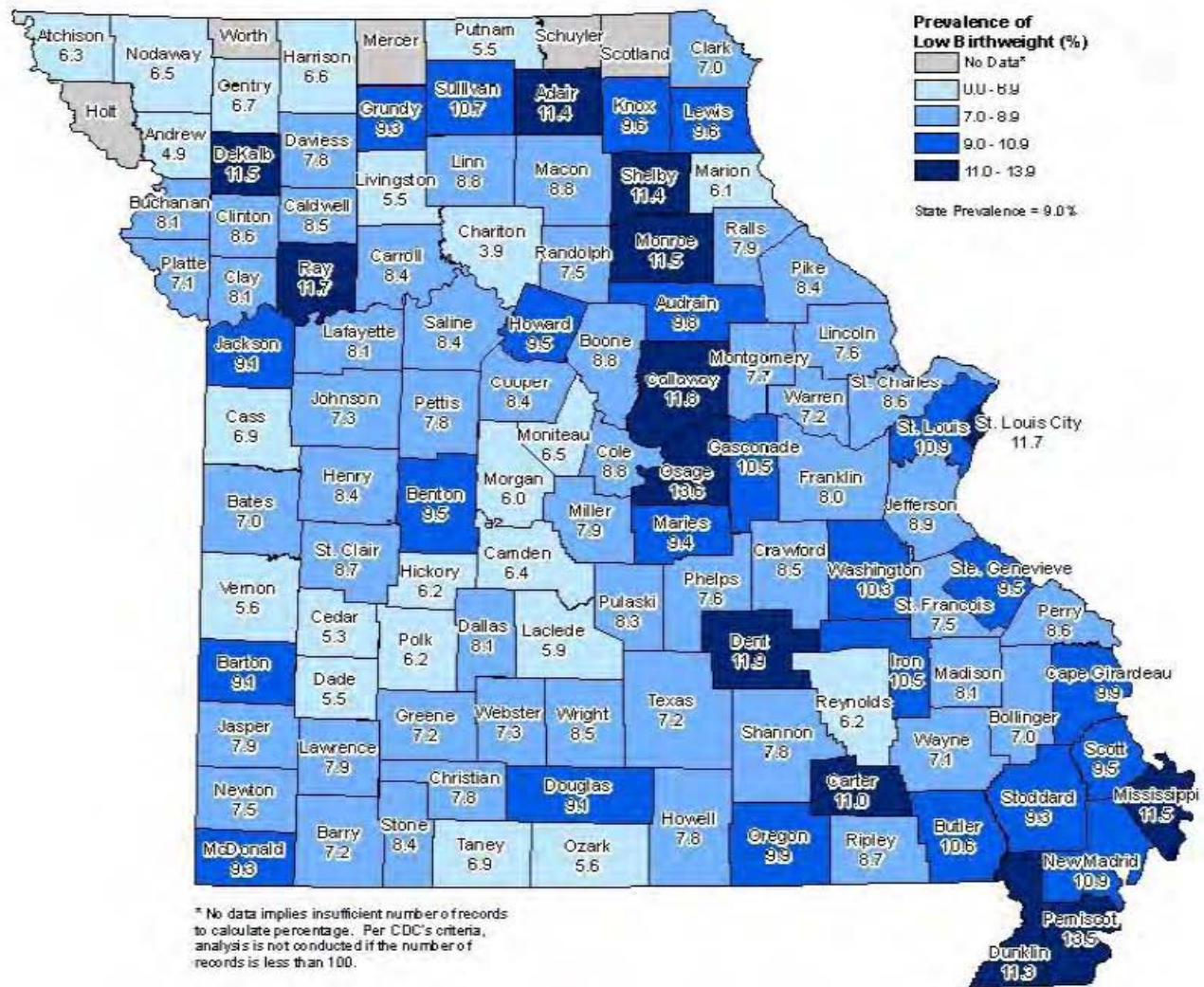
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## APPENDICES

### Appendix 1

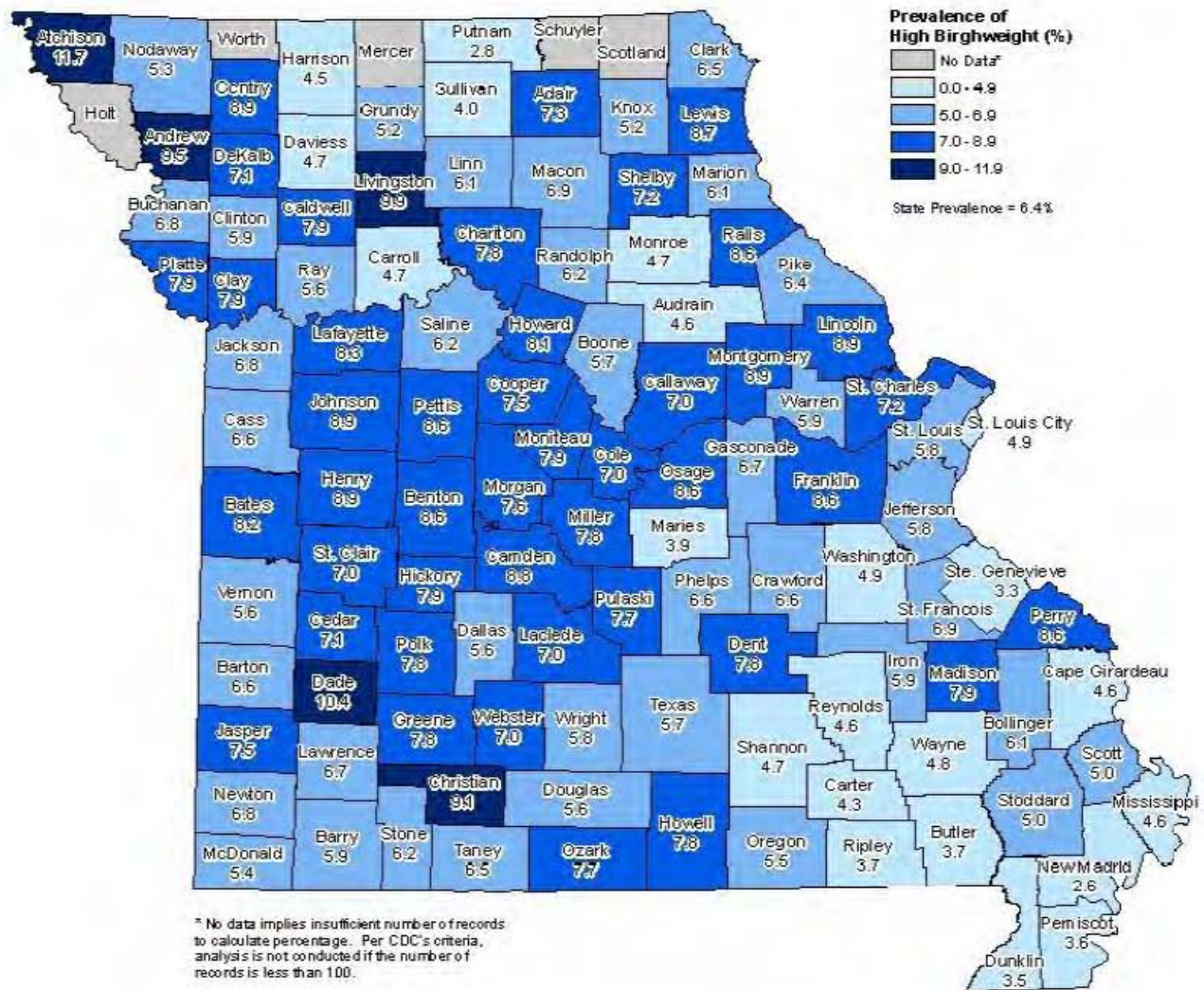
**Prevalence of Low Birthweight by County,  
Missouri PedNSS 2006-2008 Combined Years**





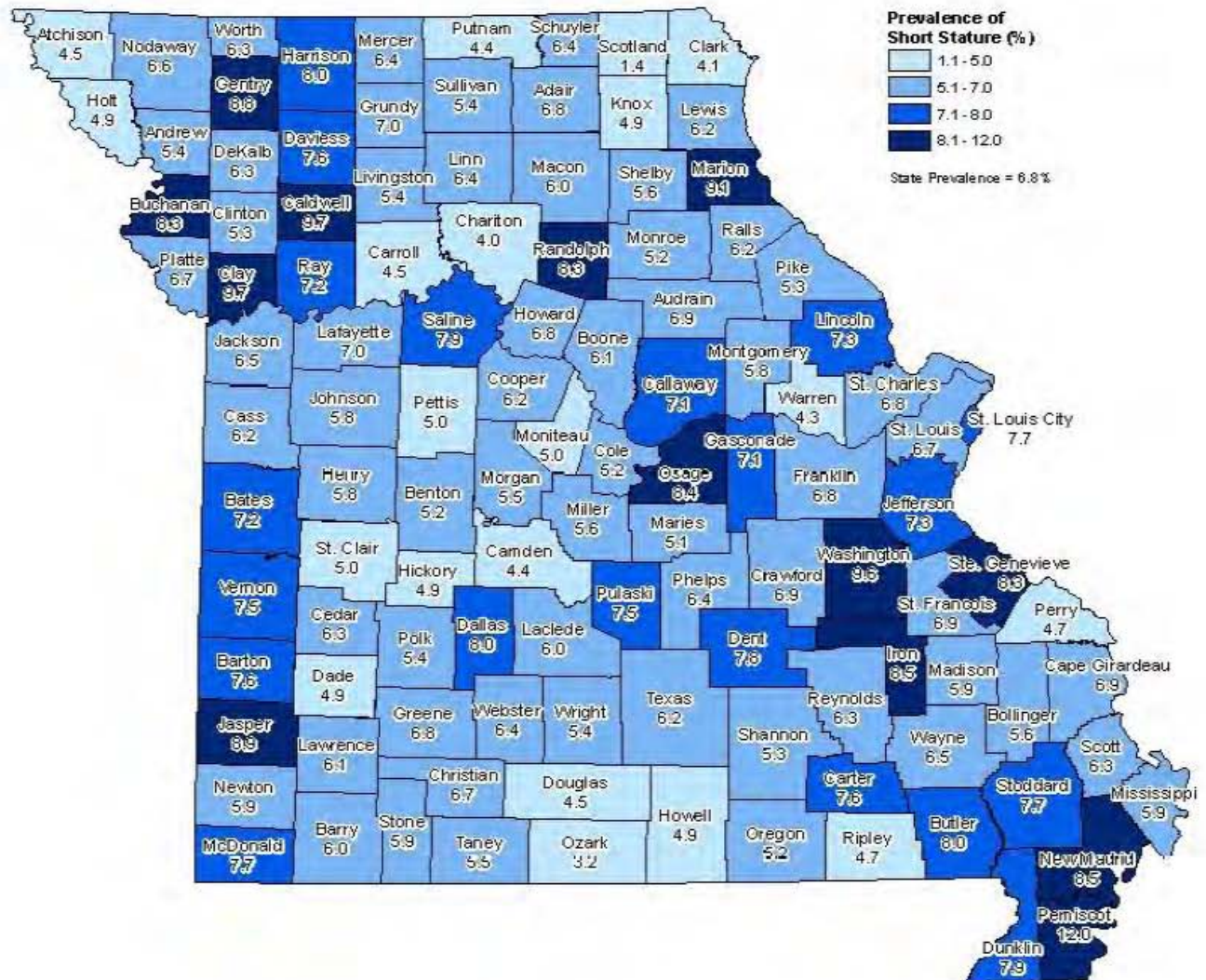
## Appendix 2

**Prevalence of High Birthweight by County,  
Missouri PedNSS 2006-2008 Combined Years**



Appendix 3

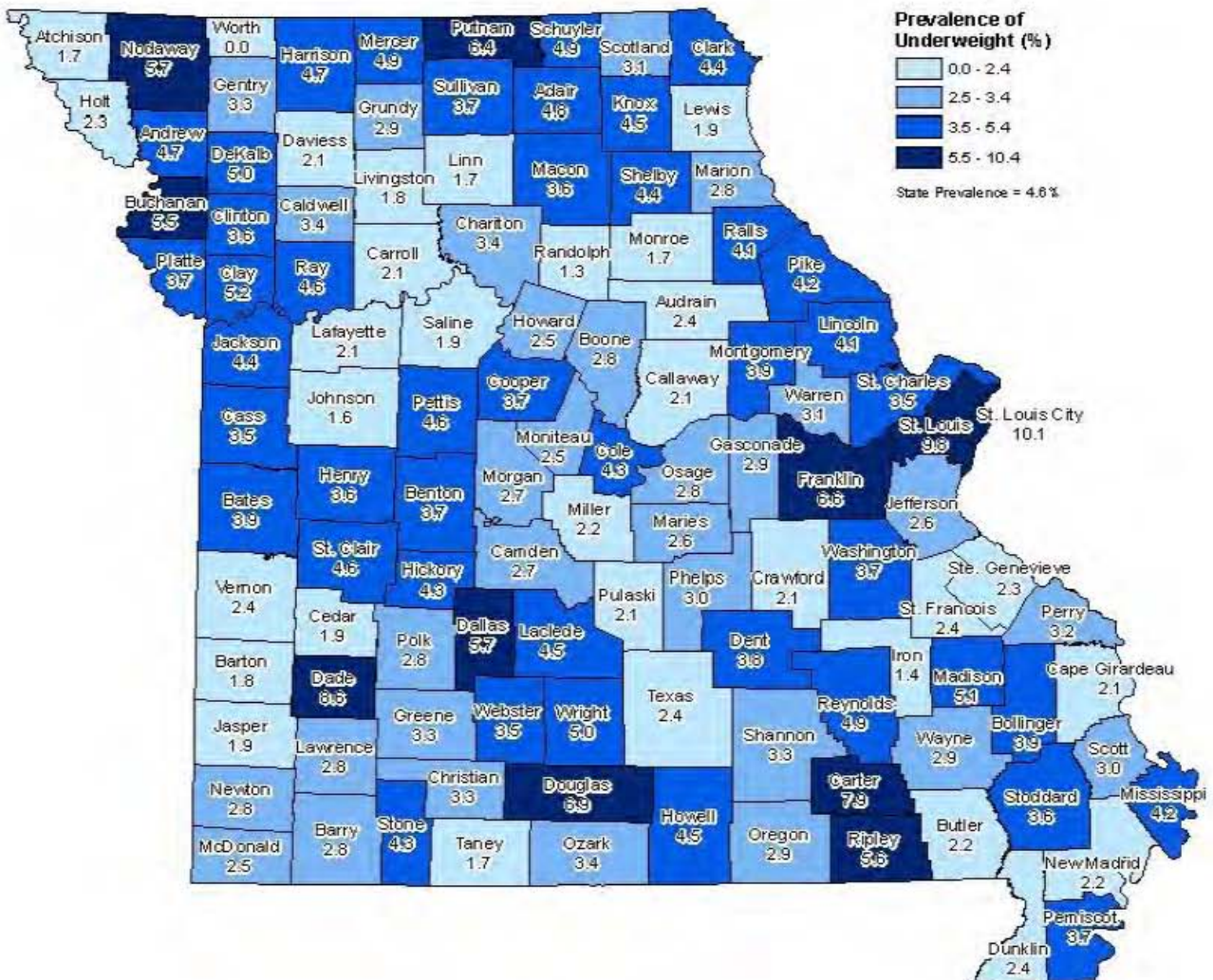
**Prevalence of Short Stature by County,  
Missouri PedNSS 2006-2008 Combined Years**





Appendix 4

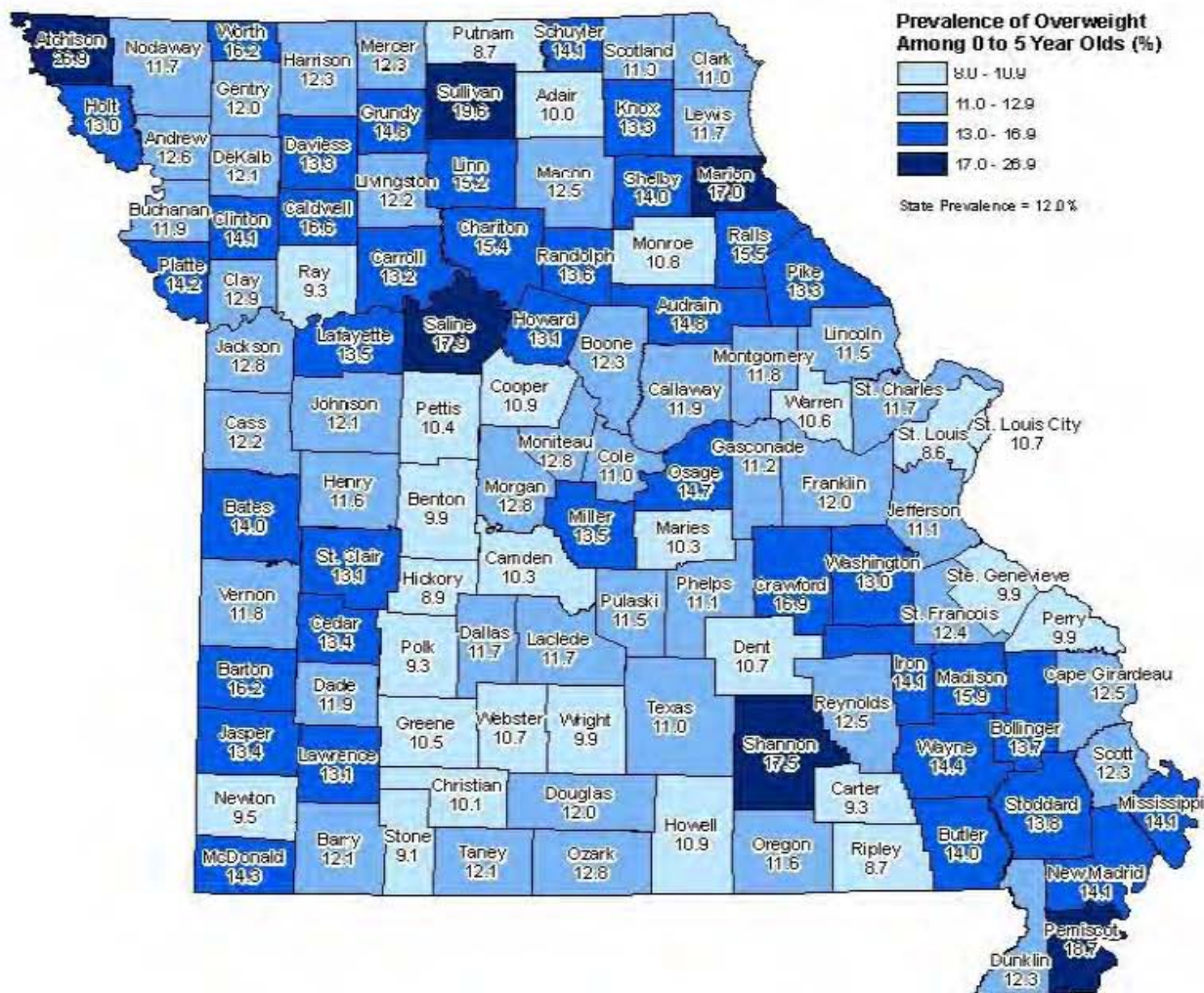
**Prevalence of Underweight by County,  
Missouri PedNSS 2006-2008 Combined Years**





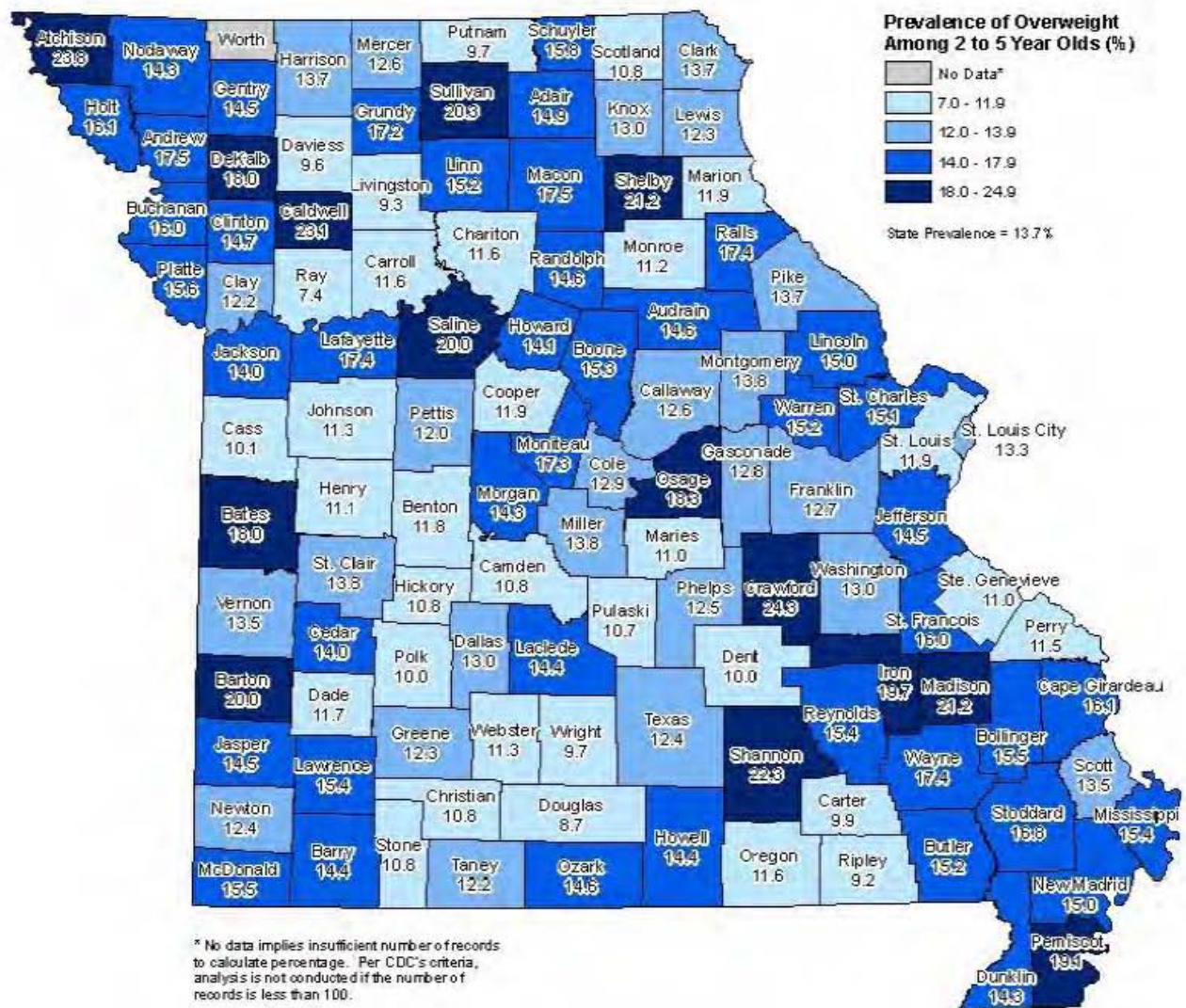
Appendix 5

**Prevalence of Overweight Among 0 - 5 Year Olds by County,  
Missouri PedNSS 2006-2008 Combined Years**



Appendix 6

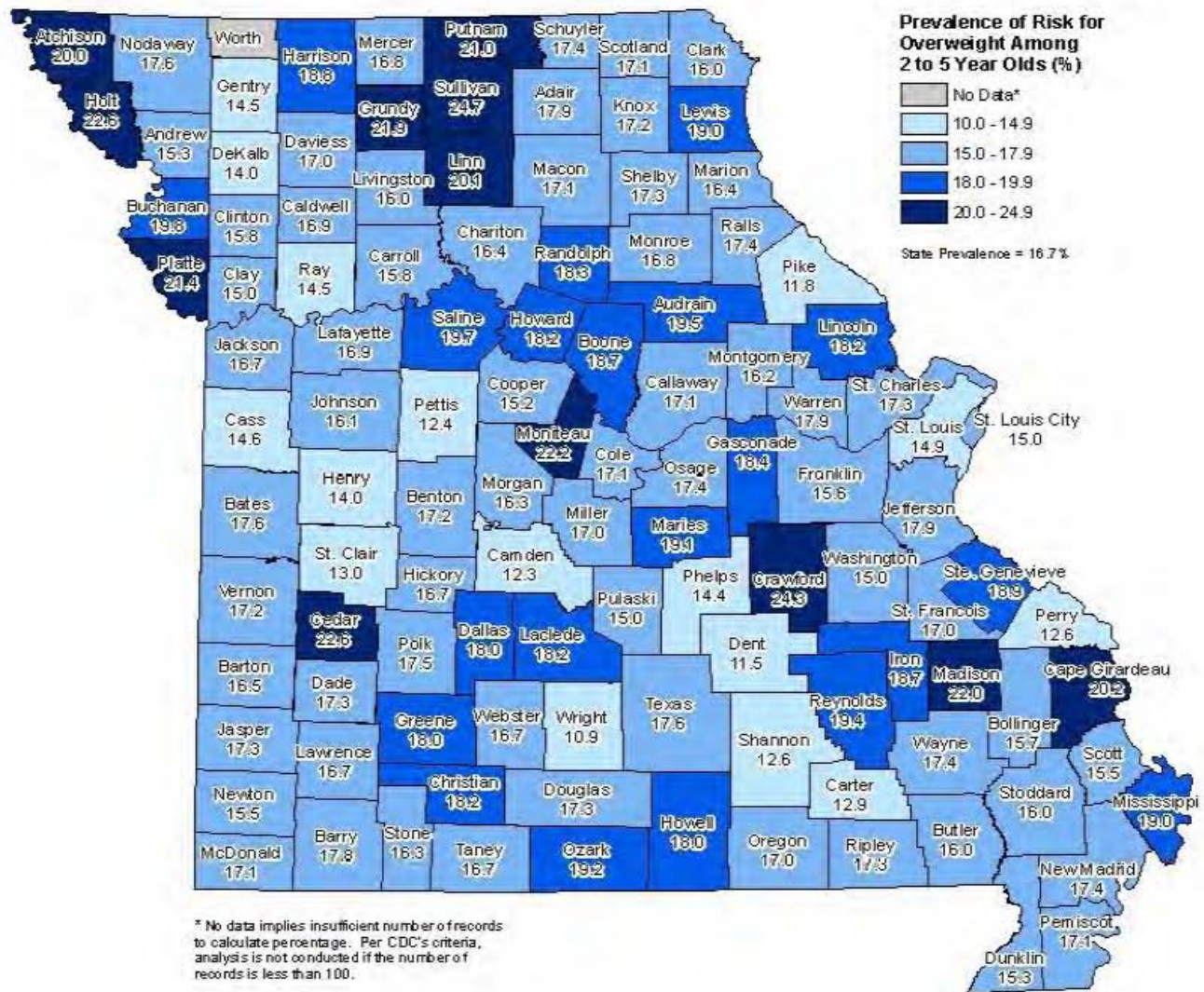
**Prevalence of Overweight Among 2 - 5 Year Olds by County,  
Missouri PedNSS 2006-2008 Combined Years**





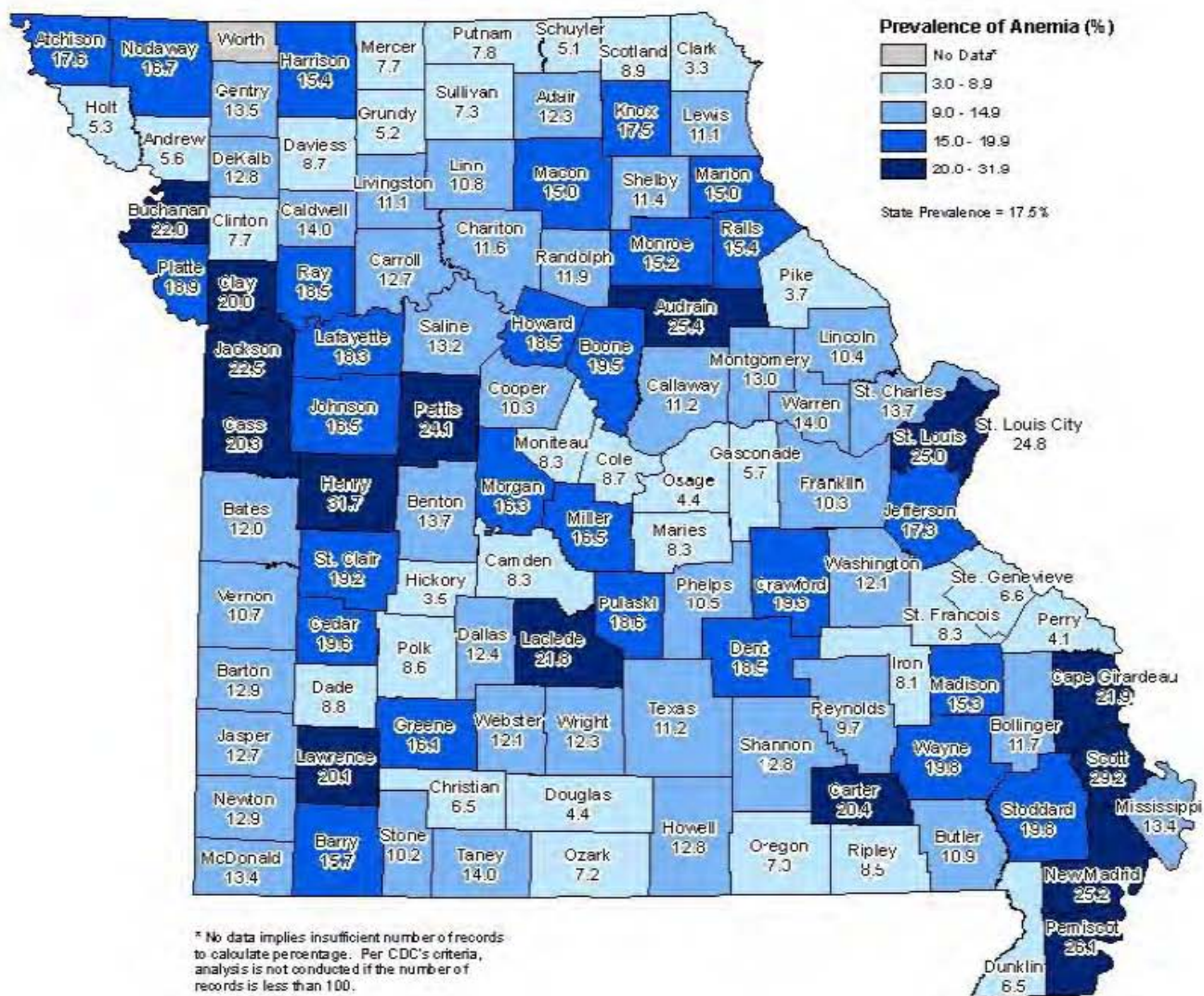
Appendix 7

**Prevalence of At Risk for Overweight Among 2 - 5 Year Olds by County,  
Missouri PedNSS 2006-2008 Combined Years**



# Appendix 8

**Prevalence of Anemia by County,  
Missouri PedNSS 2006-2008 Combined Years**





Appendix 9

**Prevalence of Infants Ever Breastfed by County,  
Missouri PedNSS 2006-2008 Combined Years**

